CLAIMS

1. A method comprising the steps of:

utilizing an ionized metal plasma tool for creating a plasma containing tantalum ions, said plasma being sustained by a mixture of gases containing nitrogen;

depositing a layer of tantalum nitride on a semiconductor wafer wherein a percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause a nitrogen content in said layer of tantalum nitride to be at least 30%.

2. The method of claim 1 wherein said mixture of gases contains argon.

3. The method of claim 1 wherein said percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause said nitrogen content in said layer of tantalum nitride to be 60%.

4. The method of claim 1 wherein said percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause said layer of tantalum nitride to become ceramic.

5. The method of claim 1 wherein said layer of tantalum nitride is used as a dielectric situated between first and second electrodes of a capacitor.

6. The method of claim 1 wherein said layer of tantalum nitride is used as an etch stop layer in fabrication of a via structure in said semiconductor wafer.

7. A structure comprising:

a first capacitor electrode;

a second capacitor electrode;

a dielectric comprising ceramic tantalum nitride situated between said first and second capacitor electrodes.

8. The structure of claim 7 wherein said first capacitor electrode is made of copper.

9. The structure of claim 7 wherein said second capacitor electrode is made of copper.

10. The structure of claim 7 wherein said dielectric comprising ceramic tantalum nitride is fabricated using a method comprising the steps of:

utilizing an ionized metal plasma tool for creating a plasma containing tantalum ions, said plasma being sustained by a mixture of gases containing nitrogen;

depositing said dielectric comprising ceramic tantalum nitride on said first capacitor electrode wherein a percentage of nitrogen partial flow in said mixture of

gases is adjusted so as to cause a nitrogen content in said dielectric comprising ceramic tantalum nitride to be at least 30%.

11. The structure of claim 10 wherein said percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause said nitrogen content in said dielectric comprising ceramic tantalum nitride to be 60%.

12. A method for etching a dielectric in a semiconductor wafer, said method comprising the steps of:

forming a ceramic tantalum nitride layer as an etch stop layer in said dielectric;

etching said dielectric with an etchant wherein said etchant does not react with said ceramic tantalum nitride layer.

13. The method of claim 12 wherein said dielectric is etched to create a via and wherein said etch stop layer is placed at a bottom of said via.

14. The method of claim 12 wherein said etchant is a plasma comprising carbon and fluoride.

15. The method of claim 12 wherein said dielectric comprises silicon dioxide.

16. The method of claim 12 wherein said step of forming said ceramic tantalum nitride layer includes the steps of:

utilizing an ionized metal plasma tool for creating a plasma containing tantalum ions, said plasma being sustained by a mixture of gases containing nitrogen;

forming said ceramic tantalum nitride layer wherein a percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause a nitrogen content in said ceramic tantalum nitride layer to be at least 30%.

17. The method of claim 16 wherein said percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause said nitrogen content in said ceramic tantalum nitride layer to be 60%.

18. A method comprising the steps of:

forming a ceramic tantalum nitride layer as an etch stop layer in a silicon dioxide dielectric;

etching a via hole in a portion of said silicon dioxide dielectric situated above said ceramic tantalum nitride layer utilizing an etchant comprising fluoride, wherein said ceramic tantalum nitride layer prevents etching a portion of said silicon dioxide dielectric situated below said ceramic tantalum nitride layer.

19. The method of claim 18 wherein said step of forming said ceramic tantalum nitride layer includes the steps of:

utilizing an ionized metal plasma tool for creating a plasma containing tantalum ions, said plasma being sustained by a mixture of gases containing nitrogen;

forming said ceramic tantalum nitride layer wherein a percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause a nitrogen content in said ceramic tantalum nitride layer to be at least 30%.

20. The method of claim 19 wherein said percentage of nitrogen partial flow in said mixture of gases is adjusted so as to cause said nitrogen content in said ceramic tantalum nitride layer to be 60%.